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SUBMISSION OF SUBSTITUTE SPECIFICATION

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Sir:

Attached are a Substitute Specification and a marked-up copy of the original specification. I certify that said substitute specification contains no new matter and includes the changes indicated in the marked-up copy of the original specification.

Respectfully submitted,

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AIRJET SPINNING DEVICE

BACKGROUND AND SUMMARY OF THE INVENTION

[0001] The present invention relates to an airjet spinning arrangement including a fiber feed channel and a thread withdrawal channel, which is arranged downstream of the fiber feed channel and which is movable away from the fiber feed channel, into which thread withdrawal channel runs an injector channel connectable to a compressed air source.

[0002] An airjet spinning arrangement of this type is prior art in European published patent application 0 787 843. During the spinning operation, a staple fiber strand is drafted to a thin fiber strand in a drafting unit arranged upstream of the airjet spinning arrangement, to which fiber strand the spinning twist is then given in the airjet spinning arrangement. For this process, the fiber strand is fed through a fiber feed channel of the airjet spinning arrangement into a vortex chamber to which is arranged a fluid device for generating a vortex current around the entry opening of a thread withdrawal channel. The front ends of the fibers held in the fiber strand are hereby first fed into the thread withdrawal channel, while rear free fiber ends spread out, are seized by the vortex current and wound around the front ends already located in the entry opening of the thread withdrawal channel, that is around the front ends already bound in, whereby a thread with a mostly real twist is formed.

[0003] When, for any reason, the still very weak, untwisted fiber strand or the spun thread breaks, a piecing process must take place, in which the end of the already spun thread is guided back to the drafting unit. In this case, in the

known airjet spinning arrangement, it is provided that after an interruption of the spinning process, the compressed air exiting out of the compressed air nozzles is switched off and a component including the thread withdrawal channel is moved away from the fiber feed channel. It is then possible to clean the area between the fiber feed channel and the thread withdrawal channel, as, due to the short distance between the fiber feed channel and the thread withdrawal channel during operation, it often happens that in the case of an end break, bunched fibers or threads settles in the relatively narrow gap. The removal of the thread withdrawal channel from the fiber feed channel is, however, very complicated in the known airjet spinning arrangement, as the above mentioned components are located in different housings, which, in the case of an end break, have to be completely separated from one another. Activation of the l separation of these housings is done via an external mechanism.

[0004] When the thread withdrawal channel is moved away from the fiber feed channel, the broken end of an already spun thread is fed back through the airjet spinning arrangement in the opposite direction to the operational transport direction to the drafting unit. For this purpose, an injector channel is provided in the component which comprises the thread withdrawal channel in the known airjet spinning arrangement. The injector channel is connected to the thread withdrawal channel by a mouthpiece and is aligned against the drafting unit. When this injector channel is connected to a compressed air source, a suction stream directed against the drafting unit is generated in the thread withdrawal channel. With the aid of the suction stream, the already spun thread end is transported back to the drafting unit. The thread withdrawal channel can

subsequently be moved back again by the external mechanism to the fiber feed channel into its operational position.

[0005] It is an object of the present invention to improve an airjet spinning arrangement of the above mentioned type in such a way that the piecing operation can take place in a simpler way with a significantly less complicated design.

[0006] This object has been achieved in accordance with the present invention in that the thread withdrawal channel is arranged in a piston-like component, which is movable away from the fiber feed channel by the compressed air fed to the injector channel.

[0007] Because the thread withdrawal channel is arranged in a piston-like component, it is no longer necessary to separate any housings from one another — for which an external mechanism would be necessary — in order to move the thread withdrawal channel away from the fiber feed channel. Rather, the piston-cylinder unit according to the present invention can be located completely in the inside of the airjet spinning arrangement. The compressed air for threading the piecing thread in the prior art now receives an additional function, in that it is utilized for moving the thread withdrawal channel away from the fiber feed channel. After the separation of the two components from one another, they can then be cleaned, whereby the compressed air fed through the injector channel may even be used for the cleaning process.

[0008] The compressed air acts advantageously on a loading spring, which presses the j piston-like component into an operational position when the

compressed air is cut off. Thus not only is the return movement of the thread withdrawal channel to the fiber feed channel carried out using simple means, it is also ensured that the two components guided together again achieve a stable operating position due to the loading spring. When the compressed air, effecting the separation and subsequent threading of the thread, is cut off, the thread withdrawal channel is returned to its operational position without any further activities. The piston-like component is simultaneously designed hereby as a valve, which can be actuated when compressed air is fed in. The valve subsequently establishes an effective connection between a conduit for compressed air and the injector channel. The travel of the spring corresponds to a certain extent to the valve stroke.

[0009] In an embodiment of the present invention, the piston-like component travels through a ring channel when the thread withdrawal channel is moved away from the fiber feed channel. The ring channel is connected to the conduit for compressed air. Thus, tolerances in the travel of the spring can be hereby overcome, as the ring channel dimensions in any case can be such that the mouthpiece of the injector channel reaches these ring openings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] These and further objects, features and advantages of the present invention will become more readily apparent from the following detailed description thereof when taken in conjunction with the accompanying drawing wherein:

[0011] Figure 1 shows in greatly enlarged dimensions an airjet spinning arrangement according to the present invention in axial cross section during operation; and

[0012] Figure 2 shows the same view of the same airjet spinning arrangement in a non- operational state.

DETAILED DESCRIPTION OF THE DRAWINGS

[0013] The airjet spinning arrangement shown in Figure 1 serves to produce a spun thread 2 from a staple fiber strand 3. A drafting unit 4 is arranged upstream of the airjet spinning arrangement 1.

[0014] The staple fiber strand 3 is fed to the drafting unit 4 in drafting direction A and 1 withdrawn as a spun thread 2 in withdrawal direction 8 and guided to a winding device (not shown). The only partly shown drafting unit 4 is preferably a three- cylinder drafting unit and includes therefore three roller pairs, each of which includes a driven bottom roller and an upper roller designed as a pressure roller. Only the delivery roller pair 5, 6 is shown. In a drafting unit 4 of this kind, a staple fiber strand 3 is drafted in the known way to the desired degree of fineness. Directly downstream of the drafting unit 4, a thin fiber strand 7 is present, which is drafted and still twist-free.

[0015] The fiber strand 7 is fed via a fiber feed channel 8 to the airjet spinning arrangement 1. Downstream thereof lies a so-called vortex chamber 9, in which the fiber strand 7 receives its spinning twist, so that the spun thread 2 is formed, which is withdrawn through a thread withdrawal channel 10.

[0016] A fluid device generates a vortex current during the spinning process in the vortex chamber 9 by means of blowing in compressed air through compressed air nozzles 11, which run tangentially into the vortex chamber 9. The compressed air exiting out of the nozzle openings is discharged via an evacuation channel 12, whereby the channel 12 has a ring-shaped cross section around a spindle-shaped component 13, which is stationary during operation and which includes the thread withdrawal channel 10.

[0017] An edge of a fiber guiding surface 14, acting as a twist block, is arranged in the area of the vortex chamber 9. The fiber guiding surface 14 is slightly eccentrically arranged with respect to the thread withdrawal channel 10 in the area of its entry opening 15.

[0018] In the airjet spinning arrangement 1, the fibers to be spun are, on the one hand, held together in a fiber strand 7, and thus fed from the fiber feed channel 8 into the thread withdrawal channel 10 essentially without a spinning twist, while on the other hand the fibers in the area between the fiber feed channel 8 and the thread withdrawal channel 10 are exposed to the vortex current. The vortex current causes the fibers, 1 or at least their end areas to be driven away radially from the entry opening 15 of the thread withdrawal channel 10. The threads 2 produced by the above described airjet spinning arrangement 1 display a core comprising fibers or fiber areas extending essentially in thread longitudinal direction without any significant twist, and an outer area in which the fibers or fiber areas are wrapped around the core. An airjet spinning arrangement 1 of this type permits very high spinning speeds, which lie in the range between 300 and 600 m per minute.

[0019] The compressed air exiting out of the compressed air nozzles 11 into the vortex chamber 9 is fed to the airjet spinning arrangement 1 during operation via a compressed air channel 16 in feed direction C. From the compressed air channel 16, the compressed air reaches first a ring channel 17 which surrounds the vortex chamber 9, to which the above mentioned compressed air nozzles 11 are directly connected.

[0020] During the operational spinning process, there is a very small distance x_1 between the entry opening 15 of the thread withdrawal channel 10 and the fiber feeding surface 14, which small distance x_1 can measure, for example, 0.5 mm. This small distance x_1 is adjusted in that the spindle-shaped component 13 comprising the thread withdrawal channel 10 is arranged in such a way that it is movable in an axial direction. The selected distance x_1 can be fixed during the operational state. In order to increase the distance x_1, as can be seen in Figure 2, the spindle-shaped component 13 is designed partly as a piston-like component 18 of a piston-cylinder unit 19, whose functions are described in detail below.

[0021] When for any reason the fiber strand 7 or the thread 2 breaks, the compressed air being fed to the vortex chamber 9 is first cut off, see the crossed arrow C in Figure 2. At the same time, all drives of the drafting unit 4 and of the thread withdrawal rollers (not shown) and the winding device (not shown) are switched off.

[0022] Because the spindle-like component 13 is partly designed as piston-like component 18, the moving away of the thread withdrawal channel 10 from the fiber feed channel 8 can be carried out using very simple means. Thus, for

example, a ring channel 20 surrounding the spindle-like component 13 is provided, which ring channel 20 extends through the piston-like component 18 and which is connected to a conduit 21 for compressed air. This compressed air, see arrow D in Figure 2, and the arrow crossed through in Figure 1, is fed only when the spinning process is interrupted. The compressed air entering into the ring channel 20 moves the piston-like component 18 upwards as shown in the view in Figure 2, so that the ring channel 20 increases due to the piston stroke to become an enlarged ring chamber 22. The limiting piston 23 affixed to the spindle-like component 13 thus borders the ring channel 20 during operation and the enlarged ring chamber 22 when the spinning process is interrupted. The limiting piston 23 acts hereby against a loading spring 24, which presses the piston-like component 18 into a secure operational position when the compressed air is cut off, that is, during the spinning process, The compressed air fed in via the conduit 21 serves to move away the thread withdrawal channel 10 from the fiber feed channel 8, while the loading spring 24 serves the return movement.

[0023] The very small distance x_1 during operation can be increased by the moving away of the spindle-like component 13 to a distance x_2, which then permits the cleaning of the space between fiber feed surface 14 and the entry opening 15 of the thread removal channel 10. A blast of compressed air, for example, can be fed to the fiber feed channel 8 from the outside for this purpose, whereby this cleaning air can be discharged via the evacuation channel 12 which continues to be supplied with low pressure.

[0024] When the thread withdrawal channel 10 is separated from the fiber feed channel 8, the broken-off end of the spun thread 2 can be fed back to the

drafting unit 4 against the withdrawal direction B. An injector channel 25 is provided in this case as an auxiliary device, which can be connected to the same pressure source as the ring channel 20 and whose mouthpiece 26 is connected to the thread withdrawal channel 10 and is directed towards its entry opening 15. Thus, a suction current directed against the drafting unit 4 is generated in the thread withdrawal channel 10, which suction current guides the end of the spun thread 2 to the delivery roller pair 5,6.

[0025] The compressed air fed via the conduit 21 to the ring channel 20 serves, as can be seen, not only for moving the spindle-like component 13 away from the fiber feed channel 8, but also serves as an injector air current via the injector channel 25, which permits threading of the thread end to be pieced. The piston-like component 18 is designed to a certain extent as a valve, which is actuated by the feeding of compressed air and which establishes an effective connection between the conduit 21 and the injector channel 25. Or put another way: the thread withdrawal channel 10, because of its position in a piston-like component 18, is movable away from the fiber feed channel 8 by the compressed air fed to the injector channel 25. Due to the present invention, not only can external mechanisms for separating the thread withdrawal channel 10 from the fiber feed channel 8 be omitted, but the compressed air which effects the threading simultaneously receives a further function.